

Having thus described the preferred embodiment,  
the invention is now claimed to be:

1. An image guided surgery system comprising:  
a low cost integrated computer;  
software-integrated disposable kits including:  
a digital medium with application-  
5 specific software; and,  
instrumented disposable surgical  
tools;  
a tracking system which locates the surgical  
tools while in use; and  
10 a display used in conjunction with the computer.

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2. The image guided surgery system as set  
forth in claim 1 wherein the low cost integrated computer  
includes:  
a portion of image guided surgery software that  
5 provides minimal user functionality, full user  
functionality being enabled by the application specific  
software obtained from the digital medium of the software-  
integrated disposable kit.

3. The image guided surgery system as set  
forth in claim 1 further including:  
a low cost mobile cart that holds at least the  
computer, display, and standard peripherals.

4. The image guided surgery system as set  
forth in claim 1 wherein the computer includes:  
a drive which receives and reads the digital  
medium.

a means for deactivating or encrypting the digital medium against reuse at the end of a surgical procedure.

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an input/output interface for capturing
still-images and/or live video from an imaging device;
5      a graphic input/output interface for connecting
to the display;

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10            an interface for interconnection with tracking  
sensors for monitoring position and movement of the  
instrumented surgical tools.

5           a label to identify a particular surgical  
procedure to be performed using the kit;

other accessories in sterile condition in  
10 sterile packaging;

user input devices; and  
wherein the digital medium is a disposable one-time use digital medium readable by the computer and contains a portion of image guided surgery software specific to the particular surgical procedure.

8. The image guided surgery system as set forth in claim 9 wherein the user input devices include:  
a disposable, sterilizable, wireless peripheral for use by a surgeon at the surgical site for remote  
5 communication with the computer.

9. The image guided surgery system as set forth in claim 1 wherein the digital medium includes:  
a preprogrammed one-time-use application specific software module to be used in surgery; and  
5 a preprogrammed software module describing the surgical tools, implants, and other accessories.

10. The image guided surgery system as set forth in claim 1 wherein the digital medium includes:  
preprogrammed software describing dimensional specifications of each of the tools, probes, guides, and  
5 any other instrumented accessories contained in the kit.

11. The image guided surgery system as set forth in claim 1 wherein the digital medium includes:  
preprogrammed software with 3D virtual representations, images, or information of instrumented  
5 tools, accessories, implants, and any associated hardware contained in the kits used to create 3D virtual representations of the surgical tools in the images on the display.

12. The image guided surgery system as set forth in claim 1, the digital medium includes:  
preprogrammed software for superimposing instrumented tools, accessories, implants, and associated  
5 hardware on the images in a wireframe or a user selected custom format.

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13. The image guided surgery system as set forth in claim 1 wherein the digital medium includes:

an area which stores the software application which enables full user functionality;

5 an area which stores specifications and characteristics of the instrumented surgical tools;

an area which stores 3D virtual representations, images, or information of the instrumented tools and accessories contained in the kit; and

10 an area which stores additional information relevant to a particular surgical procedure.

14. The image guided surgery system as set forth in claim 1 wherein the tracking system includes:

5 one of acoustic sensors, infrared sensors, video cameras, that are utilized to determine a location of the instrumented surgical tools.

15. The image guided surgery system as set forth in claim 1 wherein the tracking system includes:

a mobile cart for positioning the camera in the surgical suite.

16. A method of image guided surgery using a computer, a one-time-use surgical application specific kit that contains a digital medium with application specific software and instrumented surgical tools and accessories, a tracking system that locates the instrumented surgical tools while in use, and a display, the method comprising:

5 at a surgical site, removing the digital medium from the kit and inserting it into the computer;

10 augmenting software on the computer with software from the digital medium to process diagnostic images, register the diagnostic images to a patient's anatomy, register different sets of imaging modalities to each other, and track locations of the instrumented surgical tool;

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15            during a surgical procedure, displaying a  
virtual representation of the instrumented surgical tool  
on the image, correlating movement of the virtual tool  
representation on the image with movement of the  
corresponding instrumented tool in physical space;  
20            after the surgical procedure, disposing of the  
tools and disabling the digital medium against reuse.

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17. The method as set forth in claim 16 further  
including:  
          using the computer as a planning station before  
a surgical procedure to define surgical entry points and  
5        trajectories.

18. The method as set forth in claim 16 further  
includes:  
          archiving on the digital medium a record or  
history of the performed surgical procedure, including the  
5        downloaded diagnostic images, selected instruments,  
implants, length of surgical time, notes, or other  
relevant information obtained during the surgical  
procedure.

19. The method as set forth in claim 18 further  
includes:  
          replaying archived data for review and  
diagnostic follow-up.

20. The method as set forth in claim 16 further  
including:  
          deactivating or encrypting the digital medium  
against reuse after the surgical procedure.

21. The method as set forth in claim 16 further  
including:  
          preventing reuse of the disposable surgical  
tools.

FOOTNOTES



26. The method as set forth in claim 24 further including:

prior to placing the digital medium in the kit, programming the medium, with information about the surgical tools and the medical appliances in the kit.

27. The method as set forth in claim 23 further including:

prior to placing the digital medium in the kit, programming the digital medium with dimensional information about and depictions of the surgical tools.

28. The method as set forth in claim 23 further including:

after the surgical procedure, deactivating the digital media against reuse.

29. The method as set forth in claim 28 further including:

after the surgical procedure, disposing the surgical instruments and the secure digital media without reuse.

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30. A surgical kit comprising:

an identification of a surgical procedure to be performed using the kit;

instrumented surgical tools in sterile condition in sterile packaging which are used in the identified surgical procedure;

medical appliances in sterile condition in sterile packaging which are used in the identified surgical procedure;

an operator control in sterile condition in sterile packaging for electrical interconnection with a graphics processor outside a sterile field; and,

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to be tracked during image guided surgery;

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the processor includes:

media.

the processor further includes:

5

including a surgical kit which includes:

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35. The system as set forth in claim 34 wherein the kit further includes:

surgical appliances used in the indicated procedure; and

5 a user input control for controlling the processor, the user input control, the surgical appliances, and the surgical tools all being in sterile condition in the kit.

36. The system as set forth in claim 31 wherein the processor includes:

an interface for interconnection with a source of three-dimensional electronic diagnostic images;

5 an interface for interconnection with a human-readable display for displaying diagnostic images and superimposed representations of the surgical tools;

an interface for interconnection with a user input control; and,

10 an interface for interconnection with optical sensors for monitoring position and movement of the instrumented surgical tools.

37. The system as set forth in claim 31 wherein the digital media includes:

a first memory portion which stores the remain software portion;

5 a second memory portion which stores descriptive characteristics of the instrumented surgical tools;

a third memory section which stores shape displays corresponding to the surgical tools for display superimposed on a display of the diagnostic image; and,

10 a fourth memory portion which carries additional information.

Sub 3 38. In an image guided surgery system having a tracking system for tracking movement of surgical tools,

a human-viewable display, and a computer with limited user functionality for retrieving surgical information, displaying and manipulating diagnostic images on the display, surgical planning, and superimposing representations of the surgical tools on the images on the display, the improvement comprising:

10 a single use digital medium containing software  
to upgrade the computer temporarily to full user  
functionality for a preselected surgical procedure; and,

a means for disabling the software from being reused to upgrade the computer after the preselected surgical procedure.

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